Market Piracy in the Design-Based Industry : Economics and Policy regulation

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1. Introduction

Market piracy in the design-based industry is an expanding worldwide phenomenon (Grossman and Shapiro, 1988a,b; Chaudhry and Walsh, 1996; Schultz II and Saprito, 1996). It deserves a great deal of attention both because of its impressive international dimension (Verma, 1996) and its intrinsic illegality, ambiguity and powerfull potential links with criminal organizations (Andreano and Sigfried, 1980; Fiorentini and Peltzman, 1995). The aim of this paper is to develop theoretical arguments about economic agents' behavior and to shed some light on the main regulatory issues of illegal markets.

At a first sight the room for rational incentives to commercial piracy is self-evident. On one hand, an original backpack by the Italian stylist *Prada* costs, for instance, $ 510 in Manhattan, New York, and a bootleg copy costs $ 70 in Rome, just in front of Castel Sant'Angelo. On the other hand, the number of units sold can be impressive: as an example *Louis Vuitton* sells 3.5 millions units per year. Market piracy is usually noticed in sectors such as luxury goods or fashion, but piracy can also be observed in more traditional sectors such as car manufacturers, "bureautic" industry, cooking utensils, aircraft-parts and so on.

The property rights economics is the common framework to analyse intellectual property and trademarks infringements (Landes and Posner, 1987; David, 1993). Design-based goods that basically rely, like art goods (Santagata, 1998; Barrère and Santagata, 1999), on both high symbolic value and intellectual property, reveal a mixed public good nature whose legal protection implies positive transaction costs. Intellectual property is a non excludable good and the capability of capturing its yields at a very low cost gives rise to a strong economic incentive to counterfeiting. As a consequence, design-based industry is structurally confronted to forgery and has to develop legal systems and private practices to enforce excludability. Nevertheless, to emphasize at the very beginning of this work one of the many ambiguities of the illegal markets, it should be noted that unfair competition, in the form of illegal copy of a protected design, or, at some very small extent, the development of an illegal market for a single product could be appreciated by the original producer as far as these practices are an indirect way to foster his/her reputation.

The illegal market resulting from pirated products of the design-based industry is the core object of this paper. Incentives to commercial piracy are discussed in the first part of the paper. In the second part are

presented the main characteristics of the illegal organisations dealing with forgery. The third part is devoted to enforcement and policy regulation issues.

2. Design and piracy

Industrial design is a strategic device for improving the quality of a great many products and a way of fascinating consumers through its symbolic content. Moreover should be also acknowledged the actual role of design in lowering production costs in many industries. This is the reason why design is not only a trait of luxury goods: it applies as well to a large number of final and intermediate goods. According to the WIPO (World International Property Organisation) : "It is estimated that the number of registrations (and renewals) of industrial designs effected worldwide in 1995 was about 235,000; this number does not include the 5,613 design registrations or renewals under the Hague Agreement. About 1.35 million industrial design registrations were in force at the end of that year".

Given the spectacular growth of the design-based products, commercial piracy has today a large base. French statistics indicate that counterfeiting is taking place in every sectors : the average percentage of firms facing forgery is 19%, it raises to 65% in luxury goods. Experts estimate the size of illegal commerce at $6 billion a year (Tagliabue, 1997). Enforcement is difficult: in 1995 U.S. Customs officials seized not more than $46 million of couterfeited goods. The black market started in Asia (estimated to represent a quarter of the illegal market), but it has slowly come back to Europe and Italy. Paradoxically the Italian economy is now competing against itself on world market. France and United States are confronted to the same situation. To better appreciate the above figure, we may compare it with the neighborough illegal market developed in the copyright-based industry. According to IIPA estimates, global losses to the US - the country more struck by this kind of illegal practices - amounted during 1995 to $14 billion[1].

The design sector is wide and highly differentiated. Among the objects more largely counterfeited can be found: wathches, by *Cartier, Rolex, Bulgari*; handbags, by *Prada, Gucci, Louis Vuitton, Chanel*; shoes, by *Timberland*; sunglasses, by *Ray Ban, Armani*; blue jeans and prêt-ˆ-porter, by *Versace, Armani,*

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[1] This total is the sum of $2,3 billion in Motion Picture, $1,3 billion in Records and Music, $7,2 billion in Entertainment and Software, and $0,8 billion in Books. 1997 losses decreased to about $10,8 billion (IIPA, 1995 *Report).*

Lacoste; leather goods; car spare parts; inks and cartridges for printers. A museum of the forgery, the "Musée de la Contrefaçon", has even been founded in Paris, rue de la Faisanderie...

In this paper, we shall adopt a broad definition of design based products, including fashion style products such as Armani's, for instance, and less notorious productions, such as industrial spare parts whose market could be quite restricted. Yet, both style and industrial design are facing similar conterfeiting and piracy. We shall argue that the main reason is that in both cases, piracy lies on the same economic basis.

3. Piracy and economic incentives

The reasons why commodities of copyright-based industry and design-based industry are produced and exchanged in illegal markets can be traced in the special economic nature affecting this class of goods.

Given that piracy or counterfeiting can be defined as the unauthorized use of another's production, invention, or conception, our focus is on the infringement of industrial property rights (inventions, marks, industrial design) and on some cases of unfair competition (infringement of trade secrets, unfair practices) (Huntley and Stephen, 1995; Grossman and Shapiro, 1988a,b).

3.1. Counterfeiting design-based product

Counterfeiting is affecting a wide range of products and industries, but it is possible, however, to characterize and distinguish several specific forms of piracy. Each one corresponds to a different structure of the illegal market and a different strategy of the economic agents. These forms in turn affect the various aspects of the value added by the intellectual and immaterial contribution of the original producer: it can be the symbolic value, the immaterial value (trademark and mark services), the technical and functional quality of the produced good (design, innovation), or the production and distribution capacity (tacit knowledge, monopolistic distribution network). More precisely, different components of intellectual property can be counterfeited.

1. *The mark*. Here the pirate captures reputation and mark services, copying the trademark (Landes and Posner, 1987). Moreover the more licenses are traded by the original owner, the greater is the probability that the mark be copied. In some cases, such a practice can be applied to goods not actually produced by the original manufacturer. This happens, for instance, when the pirate puts counterfeited logos or

trademarks (Lacoste crocodile e.g.) on products or goods which are not actually produced by the original manufacturer (a pirate may produce Lacoste ties or handkerchief which do not exist).

2. *The design*. Piracy consists in copying and using the idea, the technical conception and the original form of a product : it can be slavish copy, free adaptation or simple use of some elements or components of the original. In general, such products counterfeit simultaneously the mark and the design. Yet, in some cases, illegal copies of the Prada and Vuitton bags are inspired by the original form and material but are not always strictly counterfeiting the trademark. Such cases are frequent in industrial goods, when only the design is counterfeited. Moreover, pirates may improve fonctions and performances of pirated goods through innovations; it has been noticed that sometimes consumers ask Vuitton for introducing innovations found in pirated sacks.

3. *Production infrastructure* - In some situations, counterfactors are actual subcontrators of the original producers, using illegally original production equipment, models and infrastructure. In such a case, pirated goods may share the very same quality of the original ones. This is the case when subcontractors overproduce in order to sell part of the production on their own. Sport or textile equipment contractors are frequently facing such situations

4. *Standards and interoperabillity* - In other cases, (spare parts in car or aircgraft industry, ink cartridges for printers), the core of the copying process do not rely on a form or a particular design but mainly on the interoperability capacity of the product . In this situation, pirates avoid patents, illegally using proprietary standards developed by the original producer in order to protect their markets and their innovations. Such standards are very important when producer uses them to bundle goods together, transferring revenues from one product to another one, overpricing some components once the customer is locked in: this is the strategy for spare parts in general. The razor manufacturers give, for instance, razors for free and selling their blades at a higher price.

5. *Product*. In certain situations, consumers and users themselves can develop unfair use or create themselves illegal counterfeiting (with potentially strong effects in case of mass production). This can happen when the producers have artificially segmented different submarkets discriminating quality and price according to different consumer's willingness to pay (business or professional use vs. private use for instance). As an example: software copies, abusive licences.

6. *Distribution network.* Finally, piracy can be originated in the distribution and retailers network. Sellers and retailers could use original trademarks and original products to tease and attract consumers, and to sell, then, more lucrative substitutes bypassing exclusivity contracts or trading illegal copies.

3.2. Entrepreneur's economic incentives to piracy.

As far as the economic nature of the goods is concerned, it should be firstly noted that the goods of copyright-based industry and design-based industry are caracterised by a high degree of publicness. In fact they could be defined as mixed public goods, in the sense that their intellectual content shares the characters of non exclusion and non rivalry of a pure public good, while the medium (material support) necessary to reveal and manifest information (CD, canvass, paper, material, etc.) is privately owned and excluded from others' consumption at low transaction costs. Such a class of goods could, then, be defined by the ratio of two factors. In monetary terms, the fist one is the economic value of the support, the second one is its intellectual property component, made by scientific and technological knowledge (innovation, secret) and by aesthetic and cultural knowledge (design and marks). A functional form of the proabability of piracy characterizing this phenomenon could be defined by the following equations :

$$\text{If } 0 \leq ([Ipv*Ms+L]/ Mv) \leq \alpha \qquad p(i) = 0 \qquad (1)$$

$$\text{If } \alpha \leq ([Ipv*Ms+L]/ Mv) \leq \beta \qquad p(i) = a*([Ipv*Ms+L]/ Mv) + b \qquad (2)$$

$$\text{If } \beta \leq ([Ipv*Ms+L]/ Mv) \qquad p(i) = 1 \qquad (3)$$

where p(i) = probability of piracing a single product i

Mv = medium monetary value of the product i

Ipv = intellectual property monetary value of i (incorporating in particular trademark and design)

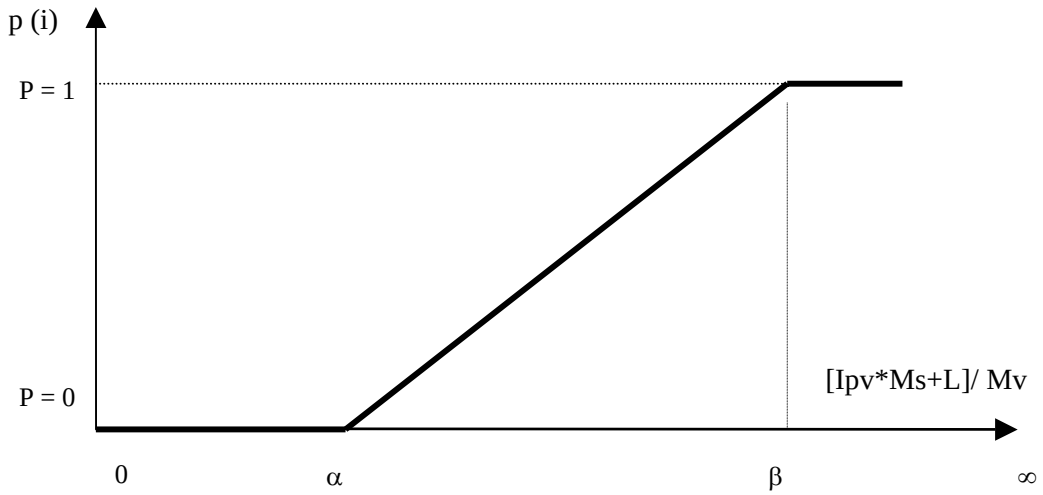
Ms = market size of product i and its close substitutes

L = number of licences traded by the original manufacturer

α and β = treshold values

a and b = constant slope ($a = 1/[\beta-\alpha]$, $b = -\alpha/[\beta-\alpha]$, as the function is continuous)

In the equation we use the ratio ([Ipv*Ms+L]/ Mv*)* as a simple way to get an agregation of the four variables, according to our hypothesis concerning the variation of probability of piracy and the existence of tresholds.



As a general rule it could be stated that the more the ratio raises, the more the probability of pirate practices increases, and viceversa. Moreover, we assume that treshold effects take place.

A necessary condition for the existence of piracy ($p(i)>0$) is that the intellectual property value be greater than zero. In fact the non rival and non excludible nature of the intellectual property creates the incentives to free ride and the basic benefits from piracy practices. If the intellectual property relating to a specific object is not protected, it is a commodity market : everybody can legally produce and sell it. Producing and selling souvenirs representing the Tour Eiffel is a free legal practice, without any copyright or design infringement.

The equations can explain that different configuration of piracy can exist and be economically interesting, according to which parameter is at stake.

When monetary value of the medium (Mv) is low, the product is easy to produce and to copy and piracy increases ($p(i) \rightarrow 1$) , on the contrary, when the value of medium is high copying is not giving any competitive advantage because pirats can hardly be more efficient than the original producer.

When intellectual property value (Ipv) is high, consumers are willing to pay for the symbolic and technological value and fakes are a great many ($p(i) \rightarrow 1$) because pirats free ride over the intellectual property componement of the goods ; in the opposite case, there is no room for counterfeiting and the situation is similar to the one describded when medium value is high.

When the number of licensees is high, some of them can have the temptation and the opportunity to develop illegal activity ($p(i) \rightarrow 1$) ; for the original producer, the cost of monitoring contracts is so high that it is obliged to accept systematic residual piracy. On the contrary, a low number of licenses allows the producer easy and strict control over licensees and subcontractors.

When the market size (Ms) is large there is more room for illegal products because the control over the market (and not only over the licensees as above) is difficult to perform, in particular at the international level : ($p(i) \rightarrow 1$). On the other hand, small markets are often niche markets which do not incentivate pirats : probability of detection is high as control over small markets is easy, sanctions have the same dimension but potential earning is very low.

As we suggested, treshold effects are taking place in each case. From the one hand, they are related to several entry barreers for the pirat (investing in production process and mastering of the technology when Mv is high or Ipv is low, creating a distribution networks when Ms is low, sanction level when L is low) : as a consequence, a treshold exists because counterfeiting is not performed until profit expectations are higher than entry costs. On the other hand, when profitability raises, piracy is always existing because of enforcement failures that make profit expectations higher than the risks of been detected and sanctionned[2]. Treshold effects deriving from residual piracy are confirmed by Shultz and Saporito (1996). The authors contend that despite enforcement mechanisms, intellectual property piracy, especially counterfeiting, will continue to be rampant in the foreseable future.

Another conclusion can be drawn from our economic definition of probability of piracing. It concerns the long term evolution of piracy on the markets. The starting point of our assumption is that for most products, the intellectual property component is continusously growing. This is firstly led by the dynamic of the technological factor, due to the incremental and systematic rationale of scientific and technical innovations. Secondly, competition on global markets lies more and more on the capability to incorporate quality into goods and to accelerate their renewal. According to our hypothesis, such evolution means that the intellectual property component (IPv) is continously growing, giving rise to an increase of probability of piracy p(i).

[2] An example of such enforcement failure giving space to piracy is given by money counterfeing : in such case, piracy exists even if enforcment and legal sanctions are very high.

3.3 A taxonomy of piracy markets

A given probability of piracy is only indicating that counterfeiting takes place. Yet, we suggest that different form of piracy can be defined. We construct a first taxonomy about piracy, distinguishing between countefeiting with equal or low[3] quality, and between counterfeiting or piracy and unfair competition.

Legal Market	UnfairCompetition	Illegal Piracy (A)	Illegal Piracy (B)
Carré de soie *Hermes*	Carré imitating *Hermes* style, either low or high quality	Carré de soie *Hermes* illegally supplied by the licensee or subcontractor (L>0)	Carré de soie, made of artificial silk, signed *Hermes* (Ipv>0)
Original product	Substitute low or high quality product	Unauthorized equal quality fake	Unauthorized low quality fake

Table 1. A taxonomy of piracy markets.

One should notice that gains at stake in illegal piracy (B) are greater than those in illegal piracy (A).

From the consumers' point of view there are no losses from illegal piracy (A). Losses arise to consumers when due to the lack of information about quality they buy pirated goods (B) at the price of the original ones: in this case both the consumer and the original producer are frauded.

From the producers' point of view illegal piracy and unfair competition are sources of losses : they decrease their incentives to create and entering methods to make copying more difficult increases costs.

Enforcement of exclusion, creating a monopolistic situation, is a means to charge the customer for innovation. If this is not the case, the market price should be lower because piracy drives original producers to a competitive market. To avoid such a situation the firms in the design-based industry use design as a strategy to differentiate their products. Establishing a mark contributes to segment the global market not only to capture the consumer surplus but to lock the customer in the mark, preventing him to make any equivalence between products. As an example, in some extent, the "carré de soie Hermes" market is different from the "carré Gucci" one as the consumer acquires it to get the Hermes griffe, the Hermes image, and not for the foulard utility.

[3] In this last case, the medium value of the good produced by the pirat < Mv.

3.4 Rational consumer choice of fakes

The rational consumer is incentivated to buy a pirated good up to an amount equivalent to the opportunity cost of sacrificing the original good. This sacrifice is made up of losses in terms of quality value, symbolic value and functional value.

The symbolic value of a design-based product, i, is a separable attribute of the quality Q:

$$Q_i = f(S_i, Z_{ij})$$
$$i= 1,2,..., i, ...N \text{ goods}$$
$$j= 1,2,..., j, ...M \text{ characteristics}$$

where S is the symbolic value of i and Z are the other j standard characteristics of the quality.

A basic case will be analysed : a potential buyer should decide whether or not to buy a fake. We assume that the fake gets its symbolic dimension from the original by analogy of sense. To approach consumer behavior we may define four alternative states of the world according to his/her cognitive structure.

1. Consumers know the quality of the original product and the fake; the original trademark is signalling information and there is no deception of the consumer about quality. Consumers have perfect information on both products. Their choice rely only on the price, the quality levels of the two alternatives (let's assume that there are no substitutes) and the welfare arising from the symbolic and qualitative content of the design-based product.

The consumer will purchase the fake if the loss (L) from the differential in quality and price is lower than the gain in welfare, W(Sf), arising from the ownership of a symbolic and designed fake good. This means that the symbolic value of the fake, W(Sf), must be greater or at least equal zero. When the loss attached to the fake is greater than its symbolic value, the rational consumer does not buy the fake.

Consumers

buy the fake	if	$L(\Delta Q / \Delta P) < W(S_f)$	(1.1)
do not buy the fake	if	$L(\Delta Q / \Delta P) > W(S_f)$	(1.2)
are indifferent	if	$L(\Delta Q / \Delta P) = W(S_f)$	(1.3)

where:

$$\Delta Q = \sum_{j=1}^{M} (Z_{jo} - Z_{jf}) + (S_o - S_f)$$

is the difference between the quality of the original product and the quality of the fake;

$\Delta P = (p_o - p_f)$ the difference between the price of the original product and the price of the fake.

In the 1.1 case, to prevent consumer willingness to piracy, the original producer could either improve the quality or lower the price, in order to raise consumer losses. High quality is the typical strategy of the luxury goods industry. On the other hand, car manufacturers have been induced to reduce the price of the original spare parts in order to limit counterfeiting.

2. Consumers know Q_o, but not Q_f .

Consumers buys the fake

$$\text{if} \quad L\left(\frac{C_{fs} + \Delta Q}{\Delta P}\right) < W(S_f) \qquad (2)$$

Where c_{sf} are the costs for searching and testing the quality of the fake. We assume that consumers are willing to know the quality of the goods they are buying. Yet, in a competitive situation between fakes and original, differences in prices can be high and consumer is not always able to give justification to such differences.

Net benefits, are greater in (1) than in (2). In other words there are more incentives to buy a fake in the state 1 then in the state 2. This implies that for the illegal producer it is better to reveal quality (c_{sf}= 0) and let the consumer know it without costs. In this case deception is not a good strategy for the illegal producer. We should raise the point that such strategy is very difficult to implement on an illegal market which are not stabilized enough to give space to confidence and reputation , and are not publicized enough to allow guarantees mechanisms.

3. Consumers know Q_f and not Q_o[4].

Consumers buys the fake

$$\text{if} \quad L\left(\frac{C_{so} + \Delta Q}{\Delta P}\right) < W(S_f) \qquad (3)$$

Where c_{so} are the costs for search and testing the quality of the original product. As it happens in the presence of experience-goods or hidden quality goods, these costs are quite high.

[4] Such a situation takes place, for instance, when trademark reputation is not high enough to to assert the quality of the good, or when a well known firm set a price far beyond consumer expectations.

4. Consumers don't know Q_f nor Q_o.

Consumers buys the fake

$$\text{if} \quad L\left(\frac{C_{fs} + C_{so} + \Delta Q}{\Delta P}\right) < W(S_f) \qquad (4)$$

In this case, we assume that consumers expect original are of better quality than fakes. If this is not the case, the producer of the fake is the only one interested in revealing information on the quality in order to reduce searching costs. As an example we can think of Louis Vuitton's products which are partly made of synthetic materials ; in this case, the manufacturer do not have any interest to publicize the real content of its products.

4. Illegal economic organization of design-based market

In the previous section, we discussed individual rational incentives of consumers and producers. In this section, we shall analyze the way in which actors interact and illegal markets organize themselves, along the production and distribution process. More precisely, we shall investigate market organisation, focusing on relationships between actors, formal and informal institutions ruling the industry.

4.1. Illegal market and economic structure

As we mentionned earlier, counterfeiter can pirate different level of value added chain of a design-based product. It can be characterized, using the traditional *filière* representation steming from conception to retail. According the forms of piracy, various level of the *filière* are confronted to fraudulent competition.

Legal	*Illegal*	*Illegal*	*Illegal*	*Illegal*	*Illegal*

example	subcontractors (*Nike*…)	bootlegging, stollen goods	fiscal evasion, unfair use, illegal private copy (services, non rivalry and non excludable goods)	forgery *(Vuitton* handbag)	spare parts
conception					
investment				**investment**	**investment**
production	**production**			**production**	**production**
distribution				**distribution**	**distribution**
commercial.		**commercial.**		**commercial.**	
consumption			**Consumption**		

Table 2. Industrial structure of illegal markets

As a consequence, original producers can be confronted to simultaneous forms of piracy, following different economic rules and implemented by different actors. From the enforcement point of view, the difficulty is that protecting the upstream of the business, the distribution level or facing a complete business require different strategies which can be, in some cases, contradictory. One alternative is, for instance, wether to enforce patents, private contracts and publicness or to keep secrecy and to prevent transparency. Another alternative could be to restrain distribution network through selective strictly controlled contracts or to commercialize heavily in order to get the market saturated by the original, leaving few space to piracy. A consequence of such dilemna is that fighting one form of piracy (at the production level for instance), the original producer can stimulate piracy at another level of the filière (retail).

4.2. Legal market, illegal market, criminal market

In the first part of our paper, we simply opposed the counterfeited products markets and the legal market. In fact, such alternative is more complex as the design based sector is not homogeneous: piracy can focus on specific part of the business. More over, from the economic and sociological point of view, the very term of "illegal" and the degree of piracy should be specified as treshold effect can take place. In particular, we shall distinguish on the one hand *illegality within the business* (illegal copyright, labor market, unfair competition and commercial abuses, fiscal evasion) and on the other hand criminal economic activities. Mainstreams economists have paid little attention to informal economic activities. However, the distinction between illegal (or irregular) and criminal markets is corroborated by economic

litterature distinguishing tax evasion and underground economy according their impact on organization of productive activities, resource allocation and efficiency[5]. By criminal market, we intend the full economic and social control of whatever part of the sector - production, distribution and commercialization - by a *criminal organisation* (different kinds of mafia, yakuza, camorra, bootlegging and drug connexions). This means that criminal organisations develop their activities outside the industrial sectors, developping specific delivery structures in order to bypass custom controls, using hidden factories, creating dedicated retail channels. A criminal organisation is defined as running a coercive power over a given territory, or over all the agents participating to the production and distribution structure of a given commodity (drugs, fakes, weapons). In economic terms, that means the existence of perfect (infinite) barriers to entry for whichever potential competitor. Acting as a "State within the State", the criminal organisation is able, as we will see later on, to control the *ring* that supplies the fake. Moreover its presence over the territory is totally pervasive, which in turn means that the criminal organisation is socially acknowleged as a local institution, whose rules are beyond the business concern and disciplinate every kind of relationship in the legal, familiar, educational and ealth sector. The criminal organisation is however tolerant, accepting that the agents of the legal and illegal activities operate on its same territory and deciding of time in time if to take their place in case of their failure or abandonment of market shares. This means that design-based industry is confronted to three different markets, using different economic rules. We shall call them as the legal market, the illegal market and the criminal market.

We shall argue that the relationships between the economic actors are structured on two different ways according to the degree of infringement of legal rules.

Filière - In the legal and illegal market, we assume that the "filière" rationale prevails. Actors are interdependent but remain autonomous. Their relationships are enforced by both formal and informal institutions. Formal institutions includes legal contracts and transparency. Informal institutions are constitued of reputation and credibility, but also defection costs born by economic actors engaged in the filière. In any case, both competition and "exit" *à la* Hirschman are allowed. Individual revenues are proportional to the value added and the potential monopolistic power of the agents.

[5] Thomas (1992) separates four groups of activities and sectors in informal economy: household, informal, irregular (these last two defining what we call illegal sector) and criminal. The author argues that irregular and informal sectors are higly efficient, even attracting workers from official sectors, and they are very important for the allocation of resources and the reliability of macroeconomic variables.

Ring - In the criminal market, actors are involved in a "ring". They are dependent on one another: a circle of financiers commissions the production of a counterfeited good, a manufacturer assembles it, a network distributes the fake to the shop, and the shop sells the fake to the customer. In such rings, relationships are ruled by fear, retorsion menace and discipline (Polo, 1997)[6]. It is not possible to have recourse to legal proceedings. The exit does not exist. Working in the illegality needs neither transparence nor visibility. As a result the logic of the ring is to split its structure and to make its levels non communicating. The ring then can lose its functional character. In this context some agent may try to break the ring jumping directly from one level to another. This can happen because the degree of specialisation in the ring is very small. In the ring the economic benefits are not distributed according to the usual market and industrial rules but according to a strict hierarchy, structured and legitimated by external factors (the criminal organization hierarchy).

We shall see, later on, that such a distinction is useful to analyze policy implications of enforcement stragegy.

5. Policy regulation of pirated products market

5.1. Enforcing intellectual property

5.1.1. An economic dilemma

Market regulation in the design-based industry is first of all devoted to a classic dilemma: whether or not to protect a monopolistic privilege arising from the acknowledgement of an enforceable property right over a design or an ornament. To protect privileges could be perceived as an unfair practice, and a wide body of literature, mainly devoted to the patent law, analysed this paradoxical trade-off (Nordhaus, 1969; David, 1993). Two schools face one another. From one hand, the scholars of the neo-liberal-hayekian school contend that in search for protecting rights, society actually limits economic growth by under providing the positive externalities related to the innovation processes. In this sense they deny pareto efficiency to the rules of legal protection. On the other hand, neo-classical scholars argument that in the lack of protection for intellectual property society will supply a low and inefficient rate of innovation. In

6 Organized crime could be considered as either a centralized decision maker or a group of non coordinated and decentralized criminal firms, i.e. mafia acting as a cartelizing agent (Gambetta and Reuter, 1997). In both cases Polo (1997) proves that the use of discipline is optimal and sign of successful criminal organization.

this view protecting author's rights will establish the optimal incentives to creativity. If creators cannot be rewarded with returns on their investment, the national economy may be harmed and deprived of tax revenues, and incomes resulting from jobs created in the economic structure that supports protected goods, like local distributions, advertising, retail.

As far as the design-based industry is concerned a further dilemma could be approached. As stated, the design-based industry is divided into one legal market and two "counter-markets": the illegal market and the market occupied by criminal organization. The illegal market is an attempt to evade the formal constraints of the law (copyright, labor regulation, and fiscal charges), but in its essential nature it is oriented to the market rules of pure competition. The criminal organization, on the contrary, is a command economy, oriented to the coercive exploitment of subordinate agents and to the shunting of legal and social norms generating costs.These organizations are typical in drugs and cigarettes, but their activity in design-based industry are not at all marginal because they can exploit the same distribution and retail networks bypassing customs and police controls. In such cases, delivery channels, market places, street pedlars are frequently the same and are all strictly controlled by coertion.

It seems reasonable to assume that all three segments of the aggregate design-based market are communicating. This means that, given the aggregate demand, it is possible, at some amount of transaction costs, to transfer activity from one another. Consumers as well can shift from one market to another.[7] If so, analysing impact and efficiency of policy regulation, one should question what happens when the State enforces law against illegal producers.

First of all, according to the rationale of the *crime economics* approach the value of the sanctions should have a deterrence effect over individual criminal behavior. In this sense it could be stated that if criminal activities are much more heavily sanctioned then illegal activities, enforcement must have success in reducing criminal behavior. However in our context of struggle with criminal organisations it seems to be relevant to distinguish between pecuniary and non pecuniary sanctions (Shavel, 1985). As a matter of fact, if pecuniary sanctions may be a strong deterrent against the strategies of the illegal firms, that - as we suggested are *within the business* - the same sanctions can be ineffective against criminal organisations, that do not reveal any capital asset, nor income to be struck at by the pecuniary sanction. Then, we have

7 Shifting from one market segment to another one has been already documented in underground economy. As far as tax evasion is concerned, Palda (1998) suggested that inefficient firms can crowd out efficient firms: severe adverse selection can take place when least efficient firms are best tax evaders.

to turn to non pecuniary sanctions. Illegal firms are without any doubt influenced by pecuniary sanctions, on the contrary their application to criminal organisations may arise a limitation. In this case, in fact, it is not possible to determine the sanction with reference to the value of the crime. To struggle with criminal organisation, like camorra or mafia, means to have recourse to actions and policies that eliminate the adversary. To fight with criminal organisation does not allow fine tuning, thus reducing the scope for an enforcement policy.

Secondly, when it is forced to respect copyright law and fiscal norms, the illegal firm losses profits and faces increasing costs. One probable consequence is that the illegal firm is thrown out of the market. In that case, both the legal monopolistic firm or the criminal organisation can replace the illegal firm in the design-based market. Our argument is that in the competition to get the market share made available from the vanishing of the illegal firm, criminal organization can prevail over the legal firm. Empirical evidences of such evolution are given by industrialization rates in regions controled by criminal organisation. Researches made in southern Italy show that in the regions where the *mafia's* social capital is powerful, the industrial setting and the birth rate of firms are lower than in the other regions : such evidences give indirect arguments confirming that when criminal organisations are existing, legal firms can hardly take their place on the market (Beccattini, 1998; Sciarrone,1998).

From the economic point of view, such competition and substitution between legal, illegal and criminal firms is supported by different reasons.

1. First of all, because of the different cost structures of the three segments of the market. As we mentioned earlier, illegal firms, and the criminal ones at a higher level, escape from paying copyright, royalties, fiscal and social charges, and from observing collective wage agreement. Furthermore, the criminal organizations may be reasonnably supposed to be more risk lovers and to enjoy a more flexible cost structure. As a consequence :

$$C_o > C_i > C_c$$

where C_o are marginal costs of original producer; C_i are marginal costs of illegal firm, and C_c are marginal costs of the criminal organisation.

In such a framework, when the illegal firm is facing higher costs from enforcement is eliminated, giving that $C_o > C_c$. The criminal organisation results to be more "efficient" and will capture the market share

left by the illegal firm. Moreover, the enforcement process being cost increasing drives the prices of the illegal firm further up, lowering the barriers that could prevent criminal organizations to enter the illegal market.

2. Secondly, the illegal ring has a higher degree of decisiveness due to its hierarchical structure based on the command. According to Burt (1992) and Block (1986), criminal organizations are particularly competent in exploiting “structural holes” of networks and markets. They strictly control information flows and develop specific capacity to coordinate agents, isolating them, optimizing decision process reducing its length and keeping intermediary monopoly power. As a consequence, it is more flexible and can react more quickly in order to carry out the steps to substitute the illegal firm.

3. The criminal organization may share two favourable characteristics. From one hand, it controls the access to the illegality. This allows the ring to rise barriers against new entries, and to rapidly create conditions for increasing the product dissemination.

4. We can assume that such a situation is reinforced by a further reason. While the legal market communicates with the illegal one mostly through the production level (subcontractors, production knowledge...), the ring is mostly sharing the distribution level with the latter (cf. Table2.).

As a consequence, from the society point of view, renforcing enforcement could be worst if the fight against illegal firms gives raise to the strenghthening of a criminal organization. The economic and social dilemma of the enforcement is socially unacceptable because the alternatives are in any case worst than the current situation. In the one hand, a firm (the illegal one) is eliminated which is a real value, a set of entrepreneurial experiences, and of skilled labor force. In the second hand, new opportunities are offered to criminal organisations, the mafia or the yakuza's structures, completely running outside the law.

From the point of view of policy regulation (Fiorentini and Peltzman, 1995)[8], an interesting option should be to try settling the dilemma in a dynamic way. As “the drug does not kill the patient", the regulation does not aim necessarily to the destruction and failure of the illegal producer but to the cancelling of fraudulent markets. We wonder if the illegal producer could be induced or, even better, “incentivated” to become a legal one, creating a new original good. Some evidences can be raised from actual national

[8] The authors stress the argument that governmental policies designed to control and limit the impact of organized crime should take into consideration impacts and consequencies of public policy makers choices upon criminal organizations strategies.

policies. One is related to new regulations of labour markets taking place in western Europe ; they aim to introduce new legal forms of labour contracts in order to give firms using illegal workers an opportunity to enter the legal market with analog job structure. Another examples is given by asian firms : after developping themselves through slavish copies (in the 50's and 60's for japanese one, in the 70's for corean, more recently for chinese one), they have been able to develop specific innovation capacities and compete legally on the international market. As a matter of fact, during the illegal activity the illegal firm learned a technique and appreciated the intellectual value of design and semiophoric goods. Once, he get at hand the devices for innovation, human and monetary capital, the interest in the illegal market fade, because any further the growth is necessarily limited by the invisibility of the illegal firm; the illegal firm cannot enter the stock market, it cannot hire skilled people in a competitive labor market, it cannot use ordinary financial fundings. The italian economy gives evidences of such an evolution : many illegal SMEs born in the 60's and 70's have turned legal, after growing towards their optimal size in the 80's and 90's.

This solution could be more efficient in terms of social welfare: it enlarges the legal market and prevents the criminal organisation from replacing the old illegal producer. In this case, the enforcement policy is oriented to help the firm to transform itself. The criminal organisation is always in ambush, but it does not increase its market power. Of course a new illegal firm may arise to copy both the new and the old legal firms products. But the dynamic sense of this kind of regulation suggests that it is possible to change a perverse effect into a virtuous outcome.

5.1.2. Discouraging passer-by consumer

As far as the shape of the demand curve for fakes and the related price elasticities are concerned, empirical evidence is until now lacking. Hovever two different hypothesis are usually put forward to analyze enforcement in the illegal markets. The first one assumes that the consumers' demand curve be concave. The second one that the demand curve be convex.

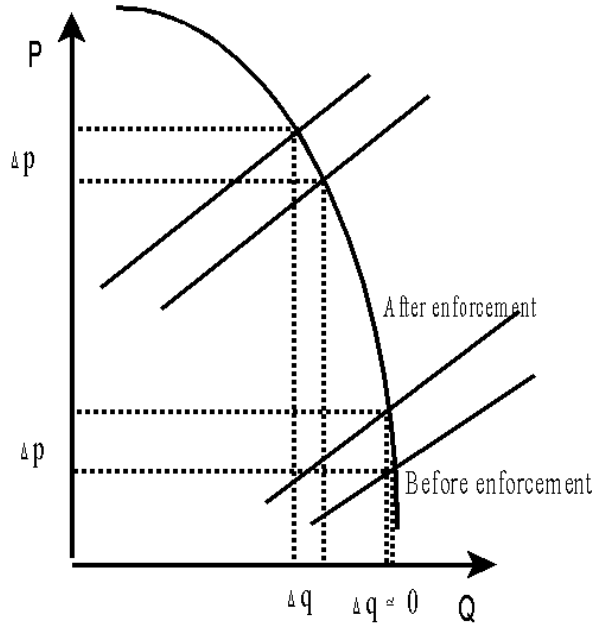


Fig. 3. Concave demand curve

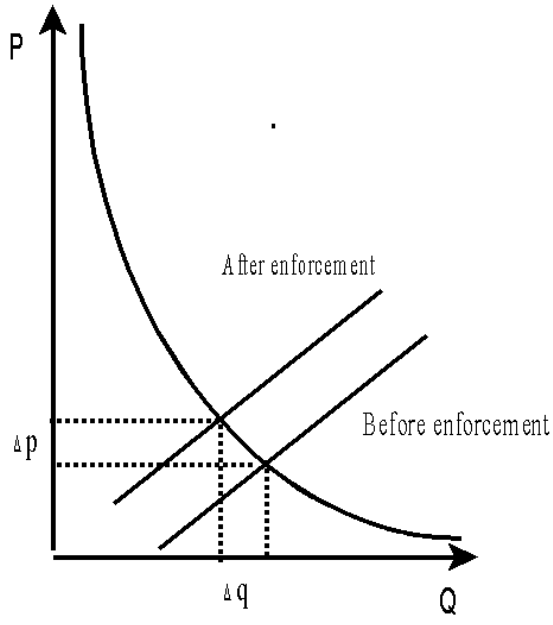


Fig. 4. Convex demand curve

In the case of concavity (White and Lusksetich, 1983), when prices are low, the demand is inelastic and any sort of enforcement based on a rise in costs and prices is inefficient. On the contrary if prices are high the enforcement will have some impact on the quantity consumed. People with a high reserve prices for illegal design-based products are in principle rare.

Moreover this hypothesis implies that the consumer will specialise in buying only one good, like in the case of a higly drug addicted consumer (Kopp, 1997). Other drawbacks of this hypothesis could be noticed: for instance that the decrease in prices drives to a saturation in the quantity consumed.

In the case of convexity (Blair and Vogel, 1973), the usual way to intend consumers' preferences, at low prices the demand is elastic. This means that the enforcement based on a rise in costs and prices, is efficient. Given that consumer with low reserve prices are usally passer-by consumers, this hypothesis is consistent with a regulation policy oriented to discourage a distract, occasional passer-by consumer.

5.2. Implementing enforcement

Economic or public actors are using two different set of rules to enforce intellectual property rights.

5.2.1. Cultural limits of international protection

The first one are legal based, consisting in the creation, adaptation and implementation of copyright, patent rights, trade mark protection and competition regulation. They are generally well known and extensively studied by scholars in law and economics, by institutions as OMPI or through international treaties. As a consequence, public policies and regulation are usually focusing at such devices (Chaudhry and Walsh, 1996).

Countries with the higher density of original producers are more interested to use international treaties in order to get a higher degree of protection in every country and to provide deterrent against piracy. However, international treaties have their own limits. Firstly, the best enforcement strategies and policies are difficult to define as economic and cultural national models may be consistent with different solutions ; some products may have a special cultural significance that, from the point of view of the producer country, excludes them from international trade treaties (cf.Samuelson, 1998).

Then, enforcement policies can provide perverse effects, worst than the starting situation. As we pointed out before brutal enforcement of the law to foster commodification and free-trade could result in an unwitting outcome, such as the strengthening of the criminal organisation or the elimination of the illegal *local* industry.

Thirdly, Treaties cannot be finalized nor enacted when illegal firms and consumers can get strong advantages through piracy (lower prices, low entry barriers, availability of commodities). Finally, harmonization is often prevented by cultural national specificities. Some countries protect design for manufactured goods with copyright law, others deny this protection (Reichman, 1983), some countries, like U.S., respect the “fair use” rule, others do not respect it. The aknowledgment of moral rights to creators is a fair and accepted practice in the European legislation, and, for instance, the United States adopted only since the 80’s a comprehensive national-enforced system of artists’moral rights (Hansmann and Santilli, 1997).

5.2.2. Private devices of protection

The second set of rules are mostly private one and structured by economic and managerial rationale. They rely on the creation and operating of control devices or on the implementation of specific production attitudes. More precisely, we can distinguish the following strategies.

1. *Tracability* - Products are individually identified (by a specific number), production and distribution is precisely controlled, users have to declare themselves and can be registrated in a file. We can find such strategy in software industry but also in wine business.

2. *Technical lock-in* - To prevent reverse engineering and unauthorized copy, illegal or unfair use, producers can try to develop technical devices such as cryptography, artificial technical limitation, non standard interfaces, complexity and global conception. Such situation can be found, for example, in videogames : the cassettes presentation of software make them very difficult to imitate, notwithstanding any patent concern.

3. *Innovation and frequent product renewal* - An other way to prevent copy is to stimulate frequent renewal of goods and to to develop high innovation rates, adding regularly technical improvements in product design or fabrication process. Using such strategy, producers remain ahead pirats : imitators can only follow the market and have great difficulty to edit faked products in due time. As an example of such strategy, we could mention electronic and Hifi, or sport shoes.

4. *Rising quality level and production complexity* - An other mean to protect manufacturers is to make products, components, material and fabrication process more difficult and sophisticated. In such situation, counterfacting process becomes very difficult, requiring higher knowledge and equipments and involving high costs. Yet, as we saw earlier, such strategy does not prevent illegal competition by lower quality products.

5. *Industrial secret* (vs. patent). There are at least two main advantages in using industrial secrets. The first one is that information about innovation has not to be revealed. The second one is that while patents have an official deadline, secrecy is for ever (let us think of Coca Cola). Such strategy could be very efficient when reverse engineering is not possible. Of course spionage and the cost of keeping the secret unrevealed can be very high.

6. *Exclusive distribution* - It give original producers two main advantages. Firstly, they can know and control their retailers' network very well. Doing so, they make pirated products very difficult to be sold as they need an alternative distribution network. Secondly, exclusive distribution constitute a public

information and give the consumer an immediate mean to know wether or not the products are legal : goods distributed outside the exclusive network are either illegal or stollen (cf. perfume or luxury).

7. *Structuring consortium or cartel* - The main objective is to share (at the business, the national or the industry level) control means and tools in order to constitute a major economic actor and to raise a credible menace for pirats and fraudulent economic actors (being them other firms or consumers). We can find such cartels in software industry (Business Software Alliance), in luxury goods (Comité Colbert), in cultural and audiovisual sector (IIPA, MPA...), but in more traditional industries as well (inks and printers spare parts).

8. *Warning strategies* - A firm alerts consumers about its counterfeited products. This could be a weak strategy, because if a firm A adopts a warning startegy, consumers might choose to procure firm's B not counterfeited products.

6. Conclusion.

The economic analysis of supply and demand for pirated-design-based goods has revealed the great complexity surrounding agent behavior and strategies put forward by the legal, illegal and criminal firms and organizations. Our argument is that such complexity highly prevent the possibility to elaborate a consistent general theory on which enforcement policies could be grounded. We should hihglight two main reasons. Firstly, as shown, the economic structures of piracy are numerous. They provide at the same time positive and negative externalities, generate different behaviors and actual trade off for both consumers and entrepreneurs. In contrast to this complex setting, due to the illegal character of the illegal markets, too little empirical evidence exist. The second reason concerns the policy regulation structure. What emerges from our analysis is the existence of a quasi inestricable economic dilemma that characterizes the enforcement policies. The dilemma is in sort governed by the diffuse power of the criminal organizations. We suggested that policies could incentivate illegal firm to emerge from the see of illegality ; we are aware that this difficult task is contrasted not only by economic forces, but by cultural ones as well.

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